Remarks

Reconsideration of this application, as amended, is respectfully requested.

Claim 56 has been amended to recite an ALD apparatus that includes a reaction chamber coupled downstream of a set of ALD chemical precursor sources and a first purge gas flow pathway, and upstream of a pumping arrangement that includes a controllable flow conductance and a pump; and a second, independent purge gas flow line placed in parallel with the ALD chemical precursor sources through a gas distribution apparatus disposed within the reaction chamber, and placed downstream from an inert gas source through both low conductance and high conductance gas flow pathways. Support for the amendments to claim 56 and for new claims 75 and 76 is found in the specification as originally filed, for example in Figure 7 and at paragraphs 46, 48-54, 56, 63, 69, 70, 73 and 75.

The rejection of claim 58 under 35 USC 112, second paragraph, is moot in view of the foregoing amendments.

The present claims are patentable over Ashley, US Patent 5565038, whether considered alone or in combination with Aral, US Patent 6022483. Ashley describes an apparatus that includes a reaction chamber and a pumping arrangement but not one that also includes a second, independent purge gas flow line placed in parallel with the ALD chemical precursor sources through a gas distribution apparatus disposed within the reaction chamber, and placed downstream from an inert gas source through both low conductance and high conductance gas flow pathways, as recited in claim 56. Figure 1 of Ashley shows only serially arranged gas flow pathways present upstream of the reaction chamber. It is true that Ashley states a second gas flow line can be coupled to the gas manifold (or directly to the reaction chamber), but this bare bones statement in no way suggests that such a line is a second, independent purge gas flow line placed in parallel with the ALD chemical precursor sources through a gas distribution apparatus disposed within the reaction chamber, and placed downstream from an inert gas source through both low conductance and high conductance gas flow pathways, as recited in claim 56.

It is worth noting that the system described by Ashley likely cannot be used for ALD. A single upstream mass flow controller (MFC) cannot, practically, be used for both precursors as such a design would compromise reliability. Using reactive precursors through a single, common MFC would create parasitic material deposits. Also, the downstream valves 13 and 14

in Ashley's system are shutoff valves, they cannot perform flow conductance adjustments as is required for ALD and especially as recited in claims 70 (i.e., according to a difference in residence times for passage of gas between (i0 upstream gas sources and the reaction chamber, and (ii) the reaction chamber and the controllable flow conductance) and 75 (i.e., to maintain a nominally constant ratio between (i) gas flow pathway conductances upstream of the reaction chamber, and (ii) gas flow pathway conductances downstream of the reaction chamber during both exposure and purge periods of an ALD cycle).

Aral is cited for teachings regarding an annular throttle valve located within the reaction chamber. But even if such teachings were combined with those of Ashley, the resulting combination still would not suggest a second, independent purge gas flow line placed in parallel with the ALD chemical precursor sources through a gas distribution apparatus disposed within the reaction chamber, and placed downstream from an inert gas source through both low conductance and high conductance gas flow pathways, as recited in claim 56. Therefore, claim 56 and its dependent claims are patentable over these references even when considered in combination with one another.

Sakai, US Patent 5,070813, discusses a coating apparatus having a downstream iris diaphragm controllable to vary the size of its central opening. However, even if such teachings were combined with those of Ashley and Aral, the resulting combination still would not suggest a second, independent purge gas flow line placed in parallel with the ALD chemical precursor sources through a gas distribution apparatus disposed within the reaction chamber, and placed downstream from an inert gas source through both low conductance and high conductance gas flow pathways, as recited in claim 56. Therefore, claim 56 and its dependent claims are patentable over the combination with of Ashley, Aral and Sakai.

With respect to new claim 76, none of the cited references teach or suggest a second purge gas flow line, independent of the chemical sources, being placed downstream from an inert gas source through both low conductance and high conductance gas flow pathways and being fed to the pump stack below the reaction chamber. While Ashley states a second gas flow line can be coupled directly to the reaction chamber, this statement in no way suggests that such a line is a purge gas flow line that is downstream from an inert gas source through both low conductance and high conductance gas flow pathways and is being fed to the pump stack below the reaction

chamber, as claimed. If anything, it suggests a second delivery mechanism for chemical sources into the reaction chamber, which is quite different from the presently claimed apparatus.

For at least the foregoing reasons, the claims are patentable over the references cited in the Office Action. If there are any additional fees associated with this communication, please charge Deposit Account No. 19-3140.

Respectfully submitted,
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Date: July 17, 2009

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